

Amylase (Cellulose Granules) Technical Sheet

High activity enzyme to digest starch for cleaning applications



HIGH ACTIVITY ECONOMICAL



CLEANING



WASHING



BULK OPTION

1. Product Overview

Amylase (detergent) enzyme is used in detergents for laundry as well as automatic dishwashing. This enzyme facilitates the removal of starch containing stains, e.g. from pasta, potato, gravy, chocolate, and baby food. Dried-up starch is difficult to remove at medium to low temperatures, especially with detergents of modest alkalinity. It adheres to the surface of laundry and dishes, acting as a glue for other stain components. The enzyme hydrolyses starch into dextrins and sugars which are readily dissolved in the washing liquor. The enzyme is an alpha-amylase produced by submerged fermentation of a genetically modified *Bacillus* microorganism.

2. Product Characteristics

Parameter	Specification
Enzyme Class	EC3.2.1.1
Source	<i>Bacillus</i>
Activity	Amylase 240,000 U per g
Unit Definition/s	* Where 1 U is the amount of enzyme required to release 1 µmol of glucose from starch under standard conditions
Carrier	Cellulose
Moisture	5-10 %
Appearance	Off white powder
Typical Dosage	1-3% w/w
Temperature Range	15–70 °C (operational)
Optimal Temperature	35–45 °C
pH Range	7.0–12.0
Optimal pH	10.0–11.0

3. Enzymatic Properties

3.1 Mechanism of Action:

Detergent-grade amylase enzymes work by hydrolysing the α-1,4-glycosidic bonds in starch-based stains, breaking large, sticky polysaccharides into smaller, water-soluble sugars that can be easily lifted and dispersed by surfactants. When applied to fabrics or dishes, the amylase quickly targets residues from foods like sauces, gravies, baby food, chocolate, and processed carbohydrates, reducing their viscosity and adhesion. These enzymes are engineered to remain active under typical wash conditions—including varying pH, the presence of surfactants, and low to moderate temperatures—allowing them to rapidly degrade stubborn starchy deposits. By

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converting complex starches into soluble fragments, detergent-grade amylases prevent redeposition, enhance overall cleaning performance, and support effective stain removal even in short-cycle and cold-water washing environments.

3.2 Kinetics:

Detergent-grade amylase enzymes follow classic Michaelis–Menten reaction kinetics, where the rate of starch hydrolysis increases with rising substrate concentration until reaching a maximum catalytic rate (V_{max}) determined by the enzyme's turnover capacity. Because starch stains exist as insoluble or semi-soluble deposits, amylase activity is influenced by substrate accessibility, making factors such as temperature, pH, and surfactant composition critical to its kinetic performance. In detergent systems, optimized formulations ensure the enzyme remains active across a broad pH range and in the presence of builders and surfactants, enabling rapid breakdown of α -1,4-glycosidic bonds. This results in the efficient conversion of complex starches into soluble oligosaccharides early in the wash cycle, accelerating stain removal and boosting overall cleaning performance even at low temperatures and short wash times.

3.2 Inhibitors:

- Heavy metals (Hg^{2+} , Cu^{2+})
- Urea, Guanidine hydrochloride, SDS
- Extreme low or high pH
- High temperatures above 90 deg. C
- High chelator concentrations (EDTA)

4. Applications

4.1 Laundry Detergents (Liquid, Powder and Pods)

- Broad-spectrum removal of starch-, protein- and fat-based stains
- Effective against food residues, sauces, dairy, egg, grease, oils and body soils
- Enhanced cleaning performance at lower wash temperatures and during short-cycle washes
- Suitable for household and professional laundry detergent formulations

4.2 Pre-Soak and Pre-Treat Stain Removers

- Targeted enzymatic breakdown of complex and mixed organic stains
- Effective against starch-based food stains, proteinaceous residues, grease, oils and sebum
- Helps loosen stubborn soils prior to the main wash cycle
- Suitable for concentrated pre-treatment and soaking formulations

4.3 High-Efficiency (HE) Washing Machine Detergents

- Effective enzymatic cleaning under low-water washing conditions
- Multi-enzyme action supports efficient stain removal during shorter wash cycles
- Helps improve cleaning performance without relying solely on high temperatures or increased chemical loading

4.4 Automatic Dishwashing Detergents

- Breakdown of starch residues, proteinaceous food soils, oils and fats

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- Helps remove dried and baked-on food residues from dishes and cookware
- Supports effective cleaning in low-temperature and rapid-wash programmes
- Suitable for powder, tablet and other automatic dishwashing formulations

4.5 Industrial & Institutional Cleaning

- Suitable for commercial laundry applications including hotels, healthcare facilities, restaurants and workwear
- Broad-spectrum degradation of starch-, protein- and lipid-based soils
- Enhanced cleaning of heavily soiled textiles, uniforms and washable materials
- Suitable for professional and institutional detergent formulations

4.6 Multi-Enzyme Detergent Formulations

- Provides synergistic amylase, protease and lipase activity for broad-spectrum stain removal
- Simultaneously targets starch-, protein- and fat-based components of complex soils
- Suitable for premium and high-performance detergent formulations
- Enables formulation of concentrated multi-enzyme cleaning products

4.7 Eco-Friendly & Low-Chemical Detergent Lines

- Supports effective cleaning at reduced wash temperatures
- May enable optimisation of surfactant and other cleaning-agent concentrations
- Supports development of energy-efficient and enzyme-based cleaning formulations
- Biodegradable cellulose carrier provides a practical granular enzyme delivery system

4.8 Fabric Care & Laundry Products

- Enzymatic removal of organic soils under comparatively mild washing conditions
- Helps reduce dependence on aggressive cleaning conditions for stain removal
- Suitable for everyday, professional and concentrated laundry formulations
- Effective against a broad range of common food and body-derived stains

4.9 Household & Hard-Surface Cleaners

- Breakdown of food residues, grease, oils and proteinaceous soils on washable surfaces
- Suitable for kitchen and general-purpose enzymatic cleaning formulations
- Effective on suitable counters, tiles, filters and other washable hard surfaces
- Can be incorporated into compatible spray, foam and concentrated cleaning formulations

4.10 Septic Tank & Waste Treatment Products

- Suitable for incorporation into enzyme-based septic tank and waste treatment formulations
- Amylase, protease and lipase provide complementary breakdown of starch-, protein- and fat-based organic matter
- Helps hydrolyse complex organic materials into smaller, more readily biodegradable components
- Suitable for biological maintenance products designed for septic tanks, drains and associated wastewater systems

5. Handling & Storage

5.1 Storage Conditions:

- Store at 4–25 °C in sealed containers
- Avoid direct sunlight and freezing
- Keep away from acids, oxidizing agents, and heavy metals

5.2 Stability on Storage:

- Activity loss ~1–2% per month at room temperature
- Refrigeration improves stability

5.3 Safety Information:

- Non-toxic and biodegradable
- May cause allergic reactions via inhalation or skin contact
- Use protective clothing, gloves, goggles
- Avoid aerosol formation

Refer to product SDS for complete safety details.

6. Packaging Options

- 0.1 kg, 1 kg, 10 kg, 25 kg

7. Quality Control Specifications

Test	Specification
Activity assay	≥ labelled activity
Microbial load	Total plate count ≤ 50,000 CFU / g
Pathogens	<i>Salmonella</i> negative, <i>E. coli</i> negative

8. Shelf Life

Powder: 12 months. When stored in original container, sealed, in cool conditions.

9. Disclaimer

This technical data sheet provides general information. Application testing is recommended to determine optimal use conditions.

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